VAN DER WERF et al. -- 10/618,264
Client/Matter: 081468-0304800

IN THE SPECIFICATION:

Please amend the specification as follows:

Page 1, below the title, please insert the following paragraph:

RELATED APPLICATION

This application claims priority to European Application 02255002.4, filed July 16, 2002, the entire contents of which are herein incorporated by reference.

Page 1, delete the paragraph [0002] and replace it with the following new paragraph:

[0002] The term "patterning device" as here employed should be broadly interpreted as referring to device that can be used to endow an incoming radiation beam with a patterned cross-section, corresponding to a pattern that is to be created in a target portion of the substrate. The term "light valve" can also be used in this context. Generally, the pattern will correspond to a particular functional layer in a device being created in the target portion, such as an integrated circuit or other device (see below). An example of such a patterning device is a mask. The concept of a mask is well known in lithography, and it includes mask types such as binary, alternating phase-shift, and attenuated phase-shift, as well as various hybrid mask types. Placement of such a mask in the radiation beam causes selective transmission (in the case of a transmissive mask) or reflection (in the case of a reflective mask) of the radiation impinging on the mask, according to the pattern on the mask. In the case of a mask, the support ~~structure~~ will generally be a mask table, which ensures that the mask can be held at a desired position in the incoming radiation beam, and that it can be moved relative to the beam if so desired.

Page 3, delete the paragraph [0008] and replace it with the following new paragraph:

[0008] For the sake of simplicity, the projection system may hereinafter be referred to as the "lens." However, this term should be broadly interpreted as encompassing various types of projection system, including refractive optics, reflective optics, and catadioptric systems, for example. The radiation system may also include components operating according to any of these design types for directing, shaping or controlling the projection beam of radiation, and such components may also be referred to below, collectively or

singularly, as a "lens". Further, the lithographic apparatus may be of a type having two or more substrate tables (and/or two or more mask tables). In such "multiple stage" devices the additional tables may be used in parallel or preparatory steps may be carried out on one or more tables while one or more other tables are being used for exposures. Dual stage lithographic apparatus are described, for example, in U.S. ~~Patent~~ Patents 5,969,441 and 6,262,796 ~~WO 98/40791~~.

Page 4, delete the paragraph [0011] and replace it with the following new paragraph:

[0011] This and other aspects are achieved according to the invention in a lithographic apparatus including an illuminator configured to supply a ~~projection~~ beam of radiation; a support configured to hold a patterning device, the patterning device configured to pattern the ~~projection~~ beam according to a desired pattern; a substrate table configured to hold a substrate; a projection system, comprising a plurality of reflectors, configured to project the patterned beam onto a target portion of the substrate; and a reflector alignment system configured to direct an alignment beam of radiation through the projection system to measure the apparent relative positions of a first reference mark provided in a fixed position on a patterning device side of the projection system and a second reference mark provided in a fixed position on a substrate side of the projection system.

Page 5, delete the paragraph [0013] and replace it with the following new paragraph:

[0013] Preferably, the numeric aperture (NA) of the reflector alignment system is smaller than that of the projection system so that the reference marks (or folding mirrors used to direct the alignment beam) can be positioned outside the object and image fields of the projection ~~lens~~ system and do not interfere with the exposure.

Page 6, delete the paragraph [0018] and replace it with the following new paragraph:

[0018] According to a further aspect of the invention there is provided a device manufacturing method including ~~providing a substrate that is at least partially covered by a layer of radiation-sensitive material; providing a projection beam of radiation; using a patterning device to endow the projection beam of radiation with a pattern in its cross-section;~~

projecting [[the]] a patterned beam of radiation onto a target portion of the layer of radiation-sensitive material at least partially covering a substrate using a projection system comprising a plurality of reflectors; and detecting positional errors or disturbances of reflectors in the projection system by directing an alignment beam through the projection system to measure the apparent relative positions of first and second reference marks provided respectively [[at]] a the patterning device side and the substrate side of the projection system.

Page 9, delete the paragraph [0036] and replace it with the following new paragraph:

[0036] 2. In scan mode, essentially the same scenario applies, except that a given target portion C is not exposed in a single "flash." Instead, the mask table MT is movable in a given direction (the so-called "scan direction", e.g., the Y direction) with a speed v, so that the ~~projection~~ beam PB is caused to scan over a mask image. Concurrently, the substrate table WT is simultaneously moved in the same or opposite direction at a speed V = Mv, in which M is the magnification of the lens PL (typically, M = 1/4 or 1/5). In this manner, a relatively large target portion C can be exposed, without having to compromise on resolution.

Page 9, delete the paragraph [0037] and replace it with the following new paragraph:

[0037] Figure 2 shows the mask MA, the projection system PL and the substrate W. The projection system PL comprises several reflectors, e.g. six reflectors M_1-M_6, which direct and focus the projection beam PB to project a reduced image of the mask pattern in mask MA onto the substrate W. The arrangement of reflectors in a projection system that may be used in the present invention in shown in Figure 2. Further details of this, and other possible systems are given in ~~EP 1 209 503~~ U.S. Patent 6,556,648. The positions and orientations of the reflectors, and particularly any changes therein, affect the position of the projected image and may also distort the image in other ways. For example, a shift in position of one or more reflectors can affect the magnification of the projected image. To minimize distortions and displacements of the projected image, which of course will result in errors in the device being manufactured, the reflectors are held in active mounts and their positions relative to the reference frame RF are thereby maintained as stable as possible. The positions of the mask MA and substrate W are also controlled relative to the reference frame RF.

Page 10, delete the paragraph [0040] and replace it with the following new paragraph:

[0040] As shown in Figure 3, the optics of the alignment systems 10, 20 are such as to have a numeric aperture NA_{AB} less than the numeric aperture NA_{PB} of the apparatus 1. For example, NA_{AB} may be about 0.05 while NA_{PB} may be about 0.25. This means that the folding mirrors can be placed to direct the alignment beams AB1, AB2 to the marks without blocking part of the ~~projection~~ beam PB. In projection systems where mirror movements and/or rotations predominantly include a shift of the projected image, one reflector alignment system may suffice. However two reflector alignment systems can be used to additionally measure rotation and magnification changes while further systems allow measurement of higher order effects, *e.g.* third order distortions.